

902 KAR 10:120. Kentucky public swimming and bathing facilities.

RELATES TO: KRS 211.180, 211.990(2)

STATUTORY AUTHORITY: KRS Chapter 13B, 194.050, 211.090(3), HB 492 (1988 Acts), EO 96-862

NECESSITY, FUNCTION, AND CONFORMITY: HB 492 (1988 Acts) directs the Cabinet for Health Services to regulate the design and construction of water distribution and treatment systems for swimming pools. KRS 211.180 directs the Cabinet for Health Services to adopt administrative regulations relating to public facilities, and their operation and maintenance in a safe, sanitary manner to protect public health and prevent health hazards. This administrative regulation establishes uniform standards for public swimming pools and other swimming or bathing facilities. The function of this administrative regulation is to assure the proper design and construction of new facilities as related to water distribution and treatment systems, and the proper operation and maintenance of all such facilities in a manner which will protect the public health. Executive Order 96-862, effective July 2, 1996, reorganizes the Cabinet for Human Resources and places the Department for Public Health and its programs under the Cabinet for Health Services.

Section 1. Citation of Administrative Regulation. This administrative regulation may be cited as the "Kentucky Public Swimming and Bathing Facilities Administrative Regulation."

Section 2. Definitions. As used in this administrative regulation the following terms shall have the meanings set forth below:

(1) "Accessible" means, if applied to a fixture, connection, appliance or equipment, having access to it, but may require the removal of an access panel, door or similar obstruction. "Readily accessible" means direct access without the necessity of removing any panel, door, or similar obstruction.

(2) "Agitation" means the mechanical or manual movement to dislodge the filter aid and dirt from the filter element.

(3) "Air gap" means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet conveying water or waste to a tank, plumbing fixture, receptor or other device, and the flood level rim of the receptacle.

(4) "Air induction system" means a system whereby a volume of air (only) is induced into hollow ducting built into a spa floor, bench, or other location. The air induction system is activated by a separate air power unit (blower).

(5) "Alkalinity or total alkalinity" means the amount of carbonates or bicarbonate present in water solution as expressed in parts per million (p.p.m.).

(6) "Approved" means accepted or acceptable under the applicable specifications stated or cited in the administrative regulation or accepted as suitable for the proposed use by the State Building Code.

(7) "Backwash" means the flow of water through the filter element or media in the reverse direction sufficient to dislodge the accumulated dirt and filter aid and remove them from the filter tank.

(8) "Backwash cycle" means the time required to backwash the filter system thoroughly.

(9) "Backwash rate" means the rate of application of water through a filter during the backwash cycle expressed in U.S. gallons per minute per square foot (liters per minute per square meter) of effective filter area.

(10) "Bather" means any person using a public swimming and bathing facility, and adjoining deck or beach area for the purpose of therapy, relaxation, recreation, competitive water sports or events, or related activities.

(11) "Bather load" means the maximum number of persons which may use the swimming and bathing facility as defined in the State Building Code.

(12) "Body feed" means the continuous addition of controlled amounts of filter aid during the operation of a diatomite type filter to maintain a permeable filter cake. If added as a slurry, this may be referred to as a slurry feed.

(13) "Cabinet" means the Cabinet for Health Services and its authorized agents.

(14) "Cartridge" means a replaceable porous filter element which can be the depth type or the surface type:

(a) "Depth type cartridge" means a filter cartridge with media not less than three-fourths (3/4) inch (.18 cm) thick which relies on penetration of particulates into the media to achieve their removal and to provide adequate holding capacity for the cartridge; and

(b) "Surface type cartridge" means a filter cartridge with media less than three-fourths (3/4) inch (.18 cm) thick which relies on retention of particulates on the surface of the cartridge to achieve their removal.

(15) "Chemical feeder output rate" means the weight or volume of active ingredients delivered by a chemical feeder expressed in units of time.

(16) "Chemical feed rate indicator" means a mechanism which will produce reproducible results expressed in units of weight or volume of chemical per unit of time, or per unit of volume of water; the mechanism may be a direct reading instrument, or may require the use of a reference chart.

(17) "Circulation piping system" means the piping between the facility structure and the mechanical equipment.

(18) "Corrosion resistant" means capable of maintaining original surface characteristics under the prolonged influence of the environment in which it is used.

(19) "Design head" means the total head requirement of the circulation system at the design rate of flow.

(20) "Design rate of flow (design filter rate)" means the rate of flow in a system which is used for design calculation. (The volume of the facility in gallons divided by the number of minutes in the turnover time.)

(21) "Diving pool" means a pool designed and intended for use exclusively by divers.

(22) "Effective filter area" means:

(a) "Permanent media type" - the effective filter area is the cross-section area of the filter surface that is perpendicular to the flow direction;

(b) "Diatomaceous earth type" - the effective filter area of the septum is that part of the septum which will accept the full thickness of precoat and through which the design filter flow will be maintained during filtration; and

(c) "Cartridge filter" - the total effective filter area is that cartridge area which is exposed to the direct flow of water. This excludes cartridge ends, seals, supports, and other areas where flow is impaired.

(23) "Factor of safety" means the ultimate load divided by the safe load or the ultimate strength divided by the allowable stress.

(24) "Filter" means a device that separates solid particles from water by recirculating it through a porous substance (a filter media or element):

(a) "Permanent media filter" means a filter that utilizes a media that can be backwashed and re-used;

(b) "Diatomaceous earth filter" means a filter that utilizes a thin layer of diatomaceous earth as its filter media that must be periodically replaced; and

(c) "Cartridge filter" means a filter that utilizes a porous cartridge as its filter media.

(25) "Filter aid" refers to any means used to enhance the efficiency of the filter media. Alum, as used on the bed of a sand filter, is also referred to as a filter aid.

(26) "Filter cycle" means the operating time between cleaning or replacing the filter media or backwash cycles.

(27) "Filter element" means a device within a filter tank designed to entrap solids and conduct water to a manifold, collection header, pipe, or similar conduit. Filter elements usually consist of a septum and septum support:

(a) "Permanent filter media" means finely graded material (such as sand, anthracite, etc.) which removes suspended filterable particles from the water.

(b) "Nonpermanent filter media" means any type of finely graded media used to coat a septum type filter usually diatomaceous earth, processed perlite or similar material for the purpose of removing fine particulates from the water.

(28) "Filter waste discharge piping" means piping that conducts wastewater from a filter to a drainage system. Connection to drainage system is made through an air gap or other approved method.

(29) "Filtration rate" means the rate of water flow through a filter while in operation, expressed in U.S. gallons per minute per square foot (liters per minute per square meter) of effective filter area.

(30) "Flow balance valve" means a device to regulate the effluent from the skimmer housing of each of a combination of two (2) or more surface skimmers.

(31) "Flume" means an inclined channel which conveys the water and the bather from the top of the slide to the plunge pool of a water slide.

(32) "Friction loss" means the pressure drop expressed in feet (meters) of water or psi (pascals) caused by liquid flowing through the piping and fittings.

(33) "Handicap pool" means a swimming pool which is designed specifically for the use of persons who are physically or mentally disabled or impaired, and is equipped with devices, appliances, ramps and other means of assisted access to the pool.

(34) "Head loss" means the total pressure drop in psi (kilopascals) or feet (meters) or head between the inlet and the outlet of a component.

(35) "Hydrojet booster pump system" means a system whereby one (1) or more hydrojets are activated by the use of a pump which is completely independent of the filtration and heating system of a spa.

(36) "Hydrojets" means a fitting which blends air and water creating a high velocity, turbulent stream of air enriched water.

(37) "Indirect waste pipe" means a pipe that does not connect directly with the drainage system, but conveys liquid wastes by discharging into a plumbing fixture, interceptor, or receptacle which is directly connected to the drainage system.

(38) "Inlet fitting" means a fitting or fixture through which filtered water enters a pool or spa.

(39) "Listed" means equipment or materials included in a list published by a listing agency that maintains periodic inspection on current production of listed equipment or materials, and whose listing states either that the equipment or material complies with approved standards or has been tested and found suitable for use in a specified manner.

(40) "Main outlet" means the outlet fitting(s) at the bottom of a facility through which passes water to a recirculating pump. It is often referred to as a "main drain."

(41) "Multiport valve" means a valve for various recirculation related operations, which combines in one (1) unit the function of two (2) or more single direct flow valves.

(42) "National Sanitation Foundation (NSF)" is based at 3475 Plymouth Road, P.O. Box 1468, Ann Arbor, MI 48106. It publishes a list of manufacturers and their equipment which has been approved as having satisfied NSF standards.

(43) "Perimeter overflow systems" means a channel at normal water level which normally extends completely around the pool perimeter. Also, known as an overflow or scum gutter.

(44) "Person" means any individual, firm, association, club, organization, partnership, business trust, corporation, company, or any state or local governmental agency.

(45) "Precoat" means the process of depositing a layer of diatomaceous earth on filter septa at

the start of a filter cycle.

(46) "Public swimming and bathing facilities" or "facility" means any natural or artificial body or basin of water which is modified, improved, constructed, or installed for the purpose of public swimming or bathing under the control of any person and includes, but is not limited to, the following:

- (a) Beaches;
- (b) Swimming pools, wading pools, wave pools;
- (c) Competition swimming pools and diving pools;
- (d) Water slides and spray pools; and
- (e) Spas, therapeutic pools, hydrotherapy pools, and whirlpools.

It includes those operated by communities, subdivisions, apartment complexes, condominiums, clubs, camps, schools, institutions, parks, mobile home parks, hotels, recreational areas, or similar public facilities. It does not include any of the above facilities which are at private single family residences intended only for the use of the owner and guests.

(47) "Public swimming and bathing facilities operator" means any "person" as defined above or any employees of that person who are delegated responsibility for the proper operation and maintenance of the facility.

(48) "Pump discharge pressure" means the actual gauge reading measured in psi taken at the discharge outlet of a pump.

(49) "Receptor" means an approved plumbing fixture or device of material, shape, and capacity to adequately receive the discharge from indirect waste piping, constructed and located to be readily cleaned.

(50) "Recirculation system" means the interconnected system traversed by the recirculated water from the pool until it is returned to the pool.

(51) "Residual chlorine" shall mean the amount of measurable chlorine remaining in water following chlorination and is composed of the following components:

(a) Free available residual chlorine shall mean the amount of chlorine which is available to inactivate microorganisms and which has not reacted with ammonia, nitrogenous material, and other material in swimming pool water;

(b) Combined residual chlorine (also called "chloramine") shall mean the amount of chlorine which has reacted and combined with ammonia and other nitrogenous material to form chloro-ammonia compounds;

(c) Total residual chlorine shall mean the arithmetic sum of free available residual chlorine and combined residual chlorine; and

(d) The word "disinfectant" may be substituted for "chlorine" in the above.

(52) "Return piping" means that part of the piping between the filter and the facility through which passes the filtered water.

(53) "Separation tank" means a device used to clarify filter rinse or wastewater.

(54) "Septum" means that part of the filter element consisting of cloth, or closely woven fabric or other porous material on which the filter cake is deposited.

(55) "Spa" means a special facility designed for recreational and therapeutic use, and which is not drained, cleaned, or refilled after each individual use. It may include, but not be limited to, units designed for hydrojet circulation, hot water, cold water, mineral bath, air induction bubbles, or any combination thereof. Common terminology for a spa includes, but is not limited to, "therapeutic pool," "hydrotherapy pool," "whirlpool," "hot spa."

(56) "Static suction lift" means the vertical distance in feet (meters) from the center line of the pump impeller to the level of water in the pool.

(57) "Spray pool" means an artificially constructed area over which water is sprayed but is not allowed to pool. Sprayed water flows to waste and is not recirculated.

(58) "Strainer" means a device used to remove hair, lint, leaves, or other coarse material on the

suction side of a pump.

(59) "Suction piping" means that portion of the circulation piping located between the facility structure and the inlet side of the pump and usually includes the following: main outlet piping, skimmer or gutter piping, vacuum piping, and surge tank piping.

(60) "Superchlorinate" means the addition to facility water of an amount of chlorine sufficient to produce a free available residual which is at least equal to ten (10) times the amount of combined residual chlorine plus the required minimum level of free available residual chlorine in order to oxidize the ammonia and nitrogenous materials which may be dissolved in the facility water.

(61) "Surface skimmer" means a device designed to continuously remove surface film and water (and return it through the filter) as part of the recirculation system, usually incorporating a self-adjusting floating weir, strainer basket, a collection tank, and a means to prevent air lock of the pump. It is sometimes referred to as a "recirculating overflow," a "mechanical" or an "automatic skimmer."

(62) "Total dynamic head" means the arithmetical difference between the total discharge head and total suction head (a vacuum reading is considered as a negative pressure). This value is used to develop the published performance curve.

(63) "Total discharge head" means the value in feet (meters) of water that a pump will raise water above its center line.

(64) "Total suction head" means the value in feet (meters) of water that a pump will lift by suction.

(65) "Total dynamic suction lift (TDSL)" means the arithmetical total of static suction lift, friction head loss, and velocity head loss working on the suction side of the pump.

(66) "Trimmer valve" means a flow adjusting device which is used to proportion flow among multiple skimmers on a single line.

(67) "Turnover time" means the time in hours or minutes, required for the circulation system to filter and recirculate a volume of water equal to the facility volume.

(68) "Vacuum piping" means the piping from the suction side of a pump connected to a vacuum fitting located at the facility and below the water level to which underwater cleaning equipment may be attached.

(69) "Velocity" means a measurement of the motion of liquids expressed in feet per second.

(70) "Wading pool" means a pool intended only for small children. The maximum depth is less than twenty-four (24) inches.

(71) "Water slide" means a slide which consists of one (1) or more flumes, a plunge pool, a pump reservoir, and water treatment facilities, where water is pumped to the top of the slide and allowed to flow down the flume to the plunge pool.

(72) "Wave pool" means a swimming pool designed for the purpose of producing wave action in the water.

(73) "Working pressure" means the normal operating pressure recommended by the manufacturer.

Section 3. Submission of Plans and Specifications for Approval. (1) No person shall begin construction, or construct, or substantially change, alter or reconstruct any public swimming and bathing facility until plans and specifications, with supporting design data as required in this administrative regulation for the proposed review of the plans, have first been submitted in quintuplicate (five (5) sets) to the cabinet through the Department of Housing, Buildings and Construction and have been approved in writing by all state or local agencies having jurisdiction. All construction shall be in accordance with approved plans. The front page of the plans shall contain the name of the swimming and bathing facility, location by city and county, name of its owner and name of the engineer, architect, or person preparing the plans. Plans submitted by an engineer or architect shall bear his seal. Plans and specifications on public swimming and bathing facilities constructed by the state or politi-

cal subdivision, or on facilities designed for a bather load of 100 or more, shall be prepared by an engineer or architect registered in the State of Kentucky and comply with the provisions of KRS 322.010 and 323.010. Plans and specifications, reports and other information shall be submitted in form and content as may be specified by the cabinet.

(2) The plans shall be drawn to scale and accompanied by proper specifications to permit a comprehensive engineering review of the plans including the piping and hydraulic details and shall include:

(a) A site plan of the general area with a plan and sectional view of the facility complex with all necessary dimensions;

(b) A piping diagram showing all appurtenances including treatment facilities in sufficient detail, as well as pertinent elevation data, to permit a hydraulic analysis of the system;

(c) The specifications shall contain details on all treatment equipment, including performance ranges of pumps, chlorinators, chemical feeders, filters, strainers, lights, skimmers, inlet and outlet fittings, diving boards, safety equipment and other related equipment;

(d) A statement of the design, bather load expected to use the facility at any given time; and

(e) Drawing of equipment room showing placement of equipment.

(3) Owners shall keep one (1) set of approved plans available for inspection at the job site in the possession of the actual builder of the facility.

(4) Upon completion of the recirculation piping system and prior to such piping being covered with dirt or concrete, the owner or builder shall contact affected agencies for inspection.

(5) Upon completion of the swimming and bathing facility, a notarized statement certifying completion of the facility in accordance with the approved plans and specifications and this administrative regulation shall be submitted to the cabinet by the engineer, architect, or person who prepared plans, and shall be accompanied by a request for inspection prior to occupancy. The facility shall not be used until final inspection by affected agencies demonstrates compliance with this administrative regulation.

(6) Unless construction is begun within one (1) year from date of approval, the approval shall expire. Extension of approval may be granted upon written request to the cabinet.

(7) No change in location, construction, design, materials, or equipment shall be made to approved plans or the facility without the written approval of the cabinet and all other agencies having jurisdiction.

Section 4. Water Supplies. (1) Potable water from an approved municipal water system or water district shall be supplied to all public swimming and bathing facilities. If these supplies are not available, a potable water supply meeting the approval of the Natural Resources and Environmental Protection Cabinet shall be provided.

(2) The water supply shall be capable of providing sufficient quantities of water under pressure to all water-using fixtures and equipment at the facility, and be capable of providing enough water to raise the water level in swimming, diving, or wave pools, and water slide plunge pools at least one (1) inch in three (3) hours.

Section 5. Water Quality and Sanitary Requirements for Bathing Beaches. (1) Prior to the issuance of plan and construction approval, the cabinet shall conduct a sanitary survey of the proposed beach. This survey shall include an evaluation of the physical, chemical, and bacteriological characteristics of the bathing beach area and the watershed.

(2) Physical quality. The following characteristics shall not be present in the beach area or watershed:

(a) Sludge deposits, solid refuse, floating waste solids, oils, grease, and scum; and

(b) Hazardous substances being discharged into bathing beach water or watershed.

(3) Bacteriological quality. The bacteriological quality of water at bathing beaches shall comply with the following criteria:

(a) It shall meet the requirements of 401 KAR 5:031, Section 6, recreational waters, as adopted by the Natural Resources and Environmental Protection Cabinet. Bacterial levels exceeding those standards shall be considered sufficient grounds to require additional investigation, survey, special analyses, and correction of any problems determined to be causing the high counts. Subsequent evaluation and satisfactory bacteriological results shall be obtained before approval for construction will be issued; and

(b) There shall be no sanitary or combined sewer discharges or other raw or partially treated sewage discharges to the bathing beach area or immediate watershed.

(4) Chemical quality. There shall be no discharges of chemical substances, other than disinfecting agents, capable of creating toxic reactions, or irritations to the skin or mucous membranes of a bather.

Section 6. Sewage and Wastewater Disposal. (1) Sewage or wastewater generated from the operation of a public swimming and bathing facility shall discharge to a public sanitary sewer. If a public sanitary sewer is not available, sewage or wastewater shall be discharged to a system which complies with 902 KAR 10:085, on-site sewage disposal systems administrative regulation.

(a) Outdoor deck or surface area drainage water may be discharged directly to storm sewers, natural drainage areas, or to the ground surface without additional treatment. Such drainage shall not result in nuisance conditions, which create an offensive odor, or which produce a stagnant wet area, or which produce an environment for the breeding of insects;

(b) Wash or backwash water from sand filters or diatomaceous earth filters shall be discharged to public sanitary sewers, or if unavailable to a system approved by the cabinet.

Section 7. Refuse Disposal. (1) All refuse at a public swimming and bathing facility shall be disposed of in a manner approved by the Natural Resources and Environmental Protection Cabinet.

(2) Refuse containers of approved design and construction, with tight fitting lids, adequate in number, shall be provided at readily accessible locations at all public swimming and bathing facilities. These containers shall be mounted upon an approved rack or holder in all outdoor locations, and shall be maintained to prevent the creation of a health or safety hazard.

(3) Refuse containers in rest rooms or bather preparation and dressing areas may be of open-top or swing-lid design, except in women's rest rooms where swing-lid or other covered top containers shall be required.

(4) Bulk refuse storage areas shall be designed, constructed, drained, and maintained to prevent rodent and vermin harborage, breeding sites, or insanitary conditions. Bulk refuse containers shall be of approved design and construction, with tight fitting lids, adequate in number, and shall be placed upon an impervious surface within a suitable enclosure to prevent access by animals.

(5) If the facility is not in use after seasonal operation or for any other reason, the facility shall not be allowed to accumulate debris, give off objectional odors, become a breeding site for insects, or create any other nuisance situation.

Section 8. Facility Design and Construction. (1) All public swimming and bathing facilities and attendant structures such as bathhouses, dressing rooms, or rest rooms, except for beach areas at bathing beaches, shall meet the design, materials, fixture, and construction requirements of the Kentucky State Building Code and the State Plumbing Code of the Department of Housing, Buildings, and Construction, Public Protection and Regulation Cabinet.

(2) The wading and swimming areas at beaches where the water is less than five (5) feet deep shall be separated from swimming and diving areas by lines securely anchored and buoyed. Safe

limits of swimming shall be marked by buoys, poles, or other markers located not over 100 feet apart and visible to bathers from a distance of at least 100 feet. Within such limits of safe swimming there shall be no boating, underwater obstructions, or other hazards which may be dangerous or cause injury to swimmers. Signs shall be provided on the beach describing these markers and stating that they indicate the limits of safe bathing. The bottom of the swimming area shall consist of sand or gravel and be of a uniform slope.

(3) If diving facilities are provided at beaches, the design and layout of the facilities and associated unobstructed water depths shall be in accordance with the State Building Code requirements for swimming and diving pools. The water surrounding any floats where diving is permitted shall be at least nine (9) and one-half (1/2) feet deep.

(4) Depth markings and lane lines.

(a) On all facilities other than beaches, the depth of the water shall be marked plainly at or above the water surface on the vertical wall of the facility if possible and on the edge of the deck next to the facility. Depth markers shall be placed at the following locations:

1. At the points of maximum and minimum depths;
2. At the point of change of slope between deep and shallow portions (transition point);
3. At intermediate two (2) feet increments of water depth; and
4. If the facility is designed for diving, at appropriate points to denote the water depths in the diving area.

(b) Depth markers shall be spaced so that the distance between adjacent markers is not greater than twenty-five (25) feet or seven and five-tenths (7.5) m as measured peripherally.

(c) Depth markers shall be in arabic numerals at least four (4) inches (ten (10) cm) high and of a color contrasting with the background. If depth markers cannot be placed on the vertical walls at or above the water level, other means shall be used, so that markings shall be visible plainly to persons in the facility.

(d) Lane lines or other markings on the bottom of the facility shall be a minimum of ten (10) inches in width and be of a contrasting color.

(e) A safety line supported by buoys shall be provided across the section of the pool where the break between the shallow and deep water occurs (five (5) feet). The line shall be placed one (1) foot toward the shallow end from where the break occurs.

Section 9. Facility Water Treatment Systems. (1) A recirculation system, consisting of pumps, piping, filters, water conditioning, disinfection equipment, and other accessory equipment shall be provided to clarify, chemically balance and disinfect the water for all swimming and bathing facilities except bathing beaches. All system components shall bear the seal of approval of the National Sanitation Foundation (NSF). (Pumps greater than seven and five-tenths (7.5) HP which are not required to meet NSF testing standards shall be considered on a case-by-case basis.)

(2) Pumping equipment.

(a) The recirculation pump and motor shall deliver the flow necessary to obtain the turnover required in the table below. A valve for flow control shall be provided in the recirculation pump discharge piping.

Turnover Rate. The turnover rate shall be as shown in the following table:

Type of Facility	Turnover Required
Diving Pools	8 hours or less
Wading Pools, Spas	30 minutes or less
Water Slides, Handicap Pools	2 hours or less

All Other Pools	6 hours or less
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Higher flow rates may be necessary in pools with skimmers so that each skimmer will have a minimum flow rate of thirty (30) gallons per minute.

(b) The pump shall be of sufficient capacity to provide a minimum backwash rate of fifteen (15) gallons per square foot of filter area per minute in sand filter systems. The pump or pumps shall supply the required recirculation rate of flow to obtain the turnover rate required at a total dynamic head of at least:

1. Fifty (50) feet for all vacuum filters;
2. Seventy (70) feet for pressure sand or cartridge filters; or
3. Eighty (80) feet for pressure diatomaceous earth filters.

(c) If the pump is located at an elevation higher than the facility water line, it shall be self-priming.

(d) If vacuum filters are used, a vacuum limit control shall be provided on the pump suction line. The vacuum limit switch shall be set for a maximum vacuum of eighteen (18) inches of mercury.

(e) A compound vacuum-pressure gauge shall be installed on the pump suction line. A vacuum gauge may be used for pumps with suction lift. A pressure gauge shall be installed on the pump discharge line adjacent to the pump.

(f) Valves shall be installed to allow the flow to be shut off during cleaning, switching baskets, or inspection of hair and lint strainers.

(g) A hair or lint strainer with openings no more than one-eighth (1/8) inch is required except for pumps that are located downstream of the filter.

(3) Water heaters shall be installed at all indoor swimming and bathing facilities. If a water heater is installed, the following shall apply:

(a) A water heater piping system shall be equipped with a bypass. A valve shall be provided at the bypass and on the influent and effluent heater piping. The influent and effluent heater piping shall be metallic in accordance with heater manufacturer's recommendations;

(b) A heating coil, pipe, or steam hose shall not be installed in any swimming and bathing facility;

(c) Thermometers shall be provided in the piping to check the temperature of the water returning from the facility and the temperature of the blended water returning to the facility;

(d) An automatic temperature limiting device with thermostatic control, which will prevent the introduction of water in excess of 100° Fahrenheit to swimming and diving pools and in excess of 104° Fahrenheit for spas shall be provided, and be accessible only to the facility operator;

(e) A pressure relief valve shall be provided and shall be piped to within six (6) inches of the floor;

(f) Venting of gas or other fuel burning water heaters shall be provided in accordance with the applicable State Building Codes;

(g) Heaters for indoor swimming and diving pools shall be capable of maintaining an overall pool water temperature between seventy-six (76) degrees Fahrenheit and eighty-four (84) degrees Fahrenheit;

(h) Combustion and ventilation air shall be provided for fuel burning water heaters in accordance with manufacturer's recommendations or the State Building Code;

(i) Heaters for indoor swimming and diving pools shall be sized on a basis of 150 BTU's/hour input per square foot of pool water surface area; and

(j) All heaters shall meet the latest standards of applicable recognized testing agencies.

(4) A flow meter shall be located so that the rate of recirculation may be easily read. Flow meters shall be installed on a straight length of pipe at a distance of at least ten (10) pipe diameters downstream, and five (5) pipe diameters upstream from any valve, elbow, or other source of turbulence.

(5) Vacuum cleaning system.

(a) A vacuum cleaning system shall be provided for all facilities except beaches, and small indoor spas designed for six (6) or less bathers. A vacuum cleaning system capable of reaching all parts of

the facility bottom shall be provided;

(b) A vacuum system may be provided which utilizes the attachment of a vacuum hose to the suction piping through the skimmer. Vacuumed water must pass through the skimmer's strainer basket;

(c) If the vacuum cleaning system is an integral part of the facility recirculation system, a wall fitting(s) shall be provided eight (8) to twelve (12) inches below the normal water level and be provided with a cap or plug. Piping from this connection shall be to the suction side of the pump ahead of the hair and lint strainer, shall be at least one and one-half (1 1/2) inches in diameter and be equipped with a control valve near the junction with the pump suction line. The size of the vacuum hose shall be at least one and one-half (1 1/2) inches in diameter and be of sufficient strength to prevent collapsing and allow adequate flow for proper cleaning;

(d) Automatic vacuum systems may be used to supplement the built-in vacuum system provided they are capable of removing all debris from the facility bottom; and

(e) Vacuum systems are to be used only when the facility is closed to bathers.

(6) Piping, skimmer and overflow system.

(a) Piping shall comply with the material specifications listed in the Kentucky State Plumbing Code for potable water. All piping, valves, or fittings shall be color coded or suitably labeled, or marked to denote its purpose within the facility water treatment system.

(b) The piping shall be designed to carry the required quantities of water at velocities not exceeding five (5) feet per second in suction piping, and ten (10) feet per second in pressure piping. Gravity piping shall be sized so that the head loss in piping, fittings, and valves does not exceed the difference in water levels between the facility and the maximum operating level in the surge or filter tank.

(c) The following waste lines shall be provided with six (6) inch air gaps at their points of discharge to the waste pump or sewer:

1. Main outlet bypass or other connections to waste;
2. Surge tank drain and overflow lines;
3. Pump discharge to waste lines; and
4. Gutter bypass to waste lines.

(7) Inlets.

(a) Each inlet shall be flow adjustable.

(b) The velocity of flow through any inlet orifice shall be in the range of five (5) to twenty (20) feet per second, except in facilities equipped with skimmers it shall be in the range of ten (10) to twenty (20) feet per second.

(c) Inlets shall be located and permanently directed to produce uniform circulation of water to facilitate the maintenance of a uniform disinfectant residual throughout the entire facility without the existence of dead spots. Inlets in facilities with skimmers shall be twelve (12) inches below the mid-point on the skimmer throat. Inlets in facilities with a prefabricated perimeter overflow system shall be eight (8) inches or more below the lip of the gutter.

(d) Inlets for swimming and diving pools, wave pools, large spas, and water slide plunge pools shall be spaced as follows:

1. Inlets shall be placed completely around the pool, each serving a linear distance of not more than fifteen (15) feet on center. The pipe serving the inlets shall form a loop completely around the pool; and

2. If inlets are to be placed on the bottom of the pool, the number of inlets shall be determined by dividing the perimeter of the pool measured in feet, by fifteen (15), any fraction thereof would represent one (1) additional inlet.

(e) Inlets for wading pools, and small spas for six (6) or less bathers, shall be at least two (2) in number, and placed so as to meet the requirements of paragraph (c) of this subsection.

(f) At least one (1) inlet shall be located in each recessed stairwell or other space where water cir-

culation might be impaired.

(g) A continuous flume, tubing, or other arrangement near the pool water surface which serves as inlet supply piping and employs multiple "jet" inlets is approved provided the individual components of the system meet the requirements of paragraphs (a), (b) and (c) of this subsection and subsections (9)(a), (b) and (10) of this section.

(h) Prefabricated perimeter overflow systems shall be approved on a case-by-case basis by the cabinet.

(8) Outlets.

(a) All facilities shall be provided with a main outlet at the deepest point to permit the facility to be completely and easily drained. Openings shall be covered by a proper grating which is not removable by bathers without the use of tools, and which cannot entrap their fingers. Openings of the grating shall be at least four (4) times the area of the main outlet pipe and have sufficient area so that the maximum velocity of the water passing through the grate does not exceed one and one-half (1 1/2) feet per second at maximum flow. The maximum width of grate openings shall be one-fourth (1/4) inch;

(b) Multiple outlets shall be provided in all facilities where the width of the facility is more than thirty (30) feet. In these cases, outlets shall be spaced not more than thirty (30) feet apart, nor more than fifteen (15) feet from side walls, and shall be connected in parallel, not series. All spas and wading pools shall have at least two (2) outlets;

(c) A hydrostatic relief valve may be provided for in-ground swimming and diving pools, wave pools, and water slide plunge pools. Subsurface drainage, if provided, shall not be directly connected to a sanitary sewer; and

(d) Main outlet piping shall be sized for removal of the water through it at a rate of at least 100 percent of the design recirculation flow rate at velocities specified in subsection (6)(b) of this section. It shall function as a part of the recirculation system. The piping system shall be valved to permit adjustment of flow through it.

(9) Perimeter overflow systems.

(a) Swimming and bathing facilities other than pools designed and used exclusively for diving, having a water surface area greater than 1,600 square feet shall have a continuous perimeter overflow system. Swimming and bathing facilities less than 1,600 square feet in area and thirty (30) feet or less in width may use surface skimmers.

(b) A perimeter overflow system shall:

1. Extend completely around the facility;
2. Permit inspection, cleaning, and repair;
3. Be designed so that no ponding or retention of water occurs within any portion of the system; or the passage of small children into an enclosed chamber;
4. Be designed to prevent the entrapment of bather's arms, legs, and feet;
5. Have an overflow lip which is rounded, provides a good handhold, and is level within two-tenths (0.2) inch;
6. Provide for the rapid removal of all water and debris skimmed from the pool's surface;
7. Be designed for removal of water from the pool's upper surface at a rate equal to 100 percent of the design turnover flow rate. If the surge volume is to be stored in the perimeter overflow system, the system shall have the capacity to carry 100 percent of the design flow while maintaining the surge storage capacity;
8. Discharge to the recirculation system;
9. Be provided with sufficient drains and piping which will not allow the overflow channel to become "flooded" when the facility is in normal use; and
10. Have drain gratings with surface area at least equal to two (2) times the area of the outlet pipe.

(10) All facilities which have perimeter overflow systems shall be provided with a net surge capacity of at least one (1.0) gallon per square foot of water surface area. Surge capacity shall be provided either in a vacuum filter tank, in the perimeter overflow system, in a surge tank, or a combination of these. Valving shall be provided where necessary, to automatically retain water during periods of facility use and to discharge water during the periods of nonuse so that the proper operating water level in the facility is maintained at all times.

(11) Skimmers are permitted on facilities whose width does not exceed thirty (30) feet and whose water surface area is 1,600 square feet or less. If skimmers are used, the following shall be met:

(a) At least one (1) skimmer shall be provided for each 500 square feet of water surface area or fraction thereof; with a minimum of two (2) skimmers provided, except for small spas, or wading pools with a water surface area of 144 square feet or less, where a minimum of one (1) skimmer shall be required.

(b) Skimmers shall be located to minimize interference with each other;

(c) The rate of flow per skimmer shall not be less than thirty (30) gallons per minute, and all skimmers shall be capable of handling at least eighty (80) percent of required flow rate;

(d) The surface skimmer piping shall have both a trimmer valve and a separate valve in the equipment room to permit adjustment of flow;

(e) Each skimmer shall be provided with an equalizer line at least one and one-half (1 1/2) inches in diameter, located at least one (1) foot below the lowest overflow level of the skimmer, and be provided with a self-closing valve;

(f) A basket which can be removed without the use of tools and through which all overflow water must pass, shall be provided; and

(g) Skimmer equipped swimming and diving pools, wave pools, water slide plunge pools, and large spas shall have a smoothly contoured handhold coping not over two and one-half (2 1/2) inches thick for the outer two (2) inches or an equivalent approved handhold. The handhold shall be no more than nine (9) inches above the normal water line.

(12) All facilities shall be equipped for the addition of make-up water from a potable water source pursuant to the following:

(a) Discharge through an air gap of at least six (6) inches to the facility to a surge tank, or a vacuum filter tank. If make-up water is added directly to the facility, the fill-spout shall be located under or immediately adjacent to a ladder rail, grab rail, or lifeguard platform. If added to a surge tank or vacuum filter tank, the six (6) inch air gap shall be measured above the top lip of the tank; and

(b) Through piping with vacuum breaker, antisiphon or other protection as specified by the State Plumbing Code.

(13) Filtration.

(a) Filters shall comply with the following:

1. Pressure filters shall have pressure gauges;

2. Pressure filters shall have an observable free fall, or a sight glass shall be installed on the backwash discharge line;

3. Pressure filters shall have a manual air-relief valve at the high point;

4. The filter backwash disposal facility shall have sufficient capacity to prevent flooding during the backwash cycle;

5. All filters shall be designed so that they can be completely drained. Filters shall be drained through a six (6) inch air gap to a pump or sanitary sewer;

6. Filter media shall meet NSF specifications;

7. Each facility shall have separate filtration and treatment systems;

8. Filter equipment and treatment systems shall operate continuously twenty-four (24) hours per day except if the facility is closed for repairs or at the end of the swimming season; and

9. Individual filters shall be designed with necessary valves and piping to permit isolation of indi-

vidual filters for repairs while other units are in service.

(b) Rapid sand or gravity sand filters:

1. Rapid sand filters shall be designed for a filter rate not to exceed three (3) gallons per minute per square foot of bed area at time of maximum head loss with sufficient area to meet the design rate of flow required by the prescribed turnover. Open gravity type filters shall be designed for a filter rate not exceeding two (2) gallons per square foot per minute.

2. Filtering media shall consist of at least twenty (20) inches of graded, sharp filter sand with an effective size between four-tenths (0.4) and 0.55 mm and a uniformity coefficient not exceeding one and 1.75, supported by at least ten (10) inches of graded filter gravel. Anthracite with effective size of six-tenths (0.6) to eight-tenths (0.8) mm with a uniformity coefficient of not greater than one and eight-tenths (1.8) may be used in lieu of the sand. A reduction in gravel depth or an elimination of gravel may be permitted where equivalent performance and service are demonstrated.

3. At least twelve (12) inches of freeboard shall be provided between the upper surface of the filter media and the lowest portion of the pipes or drains which serve as overflows during backwashing.

4. The filter system shall be designed with necessary valves and piping to permit:

a. Filtering to pool; and

b. Individual backwashing of filters to waste at a rate of not less than fifteen (15) gallons per minute per square foot of filter area. A backwash rate of eight (8) gallons per square foot per minute shall be provided for anthracite filters;

5. Each filter shall be provided with an access opening of not less than a standard eleven (11) inch by fifteen (15) inch manhole and cover.

6. The filter tank and its integral parts shall be constructed of substantial material capable of withstanding continuous anticipated usage and shall be designed for a pressure safety factor of four (4) based on the maximum shutoff head of the pump. This shutoff head for design purposes shall in no case be considered less than fifty (50) pounds per square inch.

(c) High rate sand filters. The design filtration rate shall be a minimum of five (5) gallons per minute per square foot of filter area. The maximum design filtration rate shall be the lesser of fifteen (15) gallons per minute per square foot of filter area or seventy-five (75) percent of the NSF listed filtration rate. The backwash rate shall be fifteen (15) gallons per minute per square foot of filter area.

(d) Diatomaceous earth filters.

1. The design filtration rate shall not exceed one and one-half (1 1/2) gallons per minute per square foot of filter area on diatomaceous earth filters, except that the rate of filtration may be increased to two (2) gallons per minute per square foot of filter area if continuous feeding of diatomaceous earth is employed;

2. A precoat pot shall be provided on the pump suction line for pressure diatomaceous earth systems. All diatomaceous earth filter systems shall have piping arranged to allow recycling of the filter effluent during precoating;

3. If equipment is provided for the continuous feeding of diatomaceous earth to the filter influent, the equipment shall have a capacity to feed at least one and one-half (1 1/2) ounces of this material per square foot of filter area per day;

4. Overflow piping on vacuum diatomaceous earth filters shall be provided on the filter tank to discharge overflow water; and

5. All filters shall be equipped for cleaning by one (1) or more of the following methods: backwashing; air-pump assist backwashing; spray wash; water pressure to wash vacuum filter; or agitation.

(e) Vacuum sand filters.

1. The design filtration rate shall be seventy-five (75) percent of that listed by NSF or fifteen (15)

gallons per minute whichever is lesser. The backwash rate shall be at fifteen (15) gallons per minute per square foot of filter area; and

2. Overflow piping shall be provided in order to drain overflow water.

(f) Cartridge filters.

1. Cartridge filters shall not be used on facilities with a capacity larger than 80,000 gallons;

2. Cartridge filters shall only be used on indoor pools;

3. The design filtration rate shall not exceed 0.15 gallons per minute per square foot of filter surface area; and

4. A clean duplicate set of cartridges shall be maintained at the facility.

(14) Disinfectant and chemical feeders.

(a) The minimum chemical feed equipment required at any facility shall include a unit for feed of a disinfectant and a unit for feed of a chemical for pH control, except as stated in paragraph (e) of this subsection.

(b) Equipment capacity.

1. Equipment for supplying chlorine or compounds of chlorine shall be of sufficient capacity to feed the chlorine at a rate of eight (8) p.p.m. (two and seven-tenths (2.7) lbs/day chlorine gas or its equivalent for each 10,000 gallons of pool volume) for outdoor facilities and three (3) p.p.m. (one (1) lbs/day for chlorine gas or its equivalent for each 10,000 gallons of pool volume) for indoor facilities based on the flow rates specified in subsection (2)(a) of this section;

2. The equipment for supplying chlorine shall not be controlled by a day-date clock;

3. The injection point for chlorine shall be placed on the discharge side of the pump and downstream of the flow meter;

4. Pot feeders for supplying bromo-chlorodimethylhydantoin sticks shall contain at least 0.50 pounds of bromo-chlorodimethylhydantoin per thousand gallons of facility capacity, or fraction thereof. The feeder shall have a method of feed rate adjustment;

5. Ozone may be used as a supplement to chlorination or bromination as required in subparagraph 1 or 4 of this paragraph. Ozonation equipment will be considered by the cabinet on a case-by-case basis for experimental use; and

6. No more than one (1) gram per day of ozone per ten (10) gallons per minute of flow rate will be allowed. The ambient air ozone concentration shall be less than .05 p.p.m. at all times either in the vicinity of the ozonator or at the pool water surface.

(c) If positive displacement pumps (hypochlorinators) are used to inject the disinfectant solution into the recirculation line, they shall be of variable flow type and shall be of sufficient capacity to feed the amount of disinfectant required by paragraph (b)1 of this subsection. If calcium hypochlorite is used, the concentration of calcium hypochlorite in the solution shall not exceed five (5) percent. The solution container shall have a minimum capacity equal to the volume of solution required per day at the feed rate required in paragraph (b)1 of this subsection.

(d) Gas chlorinators.

1. The chlorine supply and gas feeding equipment shall be housed in a separate, relatively airtight room. The room shall be provided with an exhaust system which takes its suction not more than eight (8) inches from the floor and discharges out-of-doors in a direction to minimize exposure to toxic fumes. The fan shall be capable of producing one (1) air change per minute. Means for introducing a fresh air supply to the enclosure through appropriate openings such as filters, grill openings, or other similar openings, at a high point opposite the exhaust fan intake shall be provided. The room shall have a window at least eighteen (18) inches square, and shall have artificial lighting. Electrical switches for lighting and ventilation shall be outside and adjacent to the door. Scales for weighing chlorine cylinders in service shall be provided. Automatic changeover chlorinators may be substituted for scales.

2. Chlorine cylinders either full or empty shall be anchored, or chained in a vertical position. The

valve protection hoods shall be kept in place, except when the cylinders are connected. Chlorine feed devices should be located directly on the tank if practical;

3. The chlorine feeding device shall be designed so that during interruptions of the flow of the water supply, gas feed is automatically terminated. In addition, the release of chlorine shall be terminated if the recirculation pump is shut off. If other than facility recirculated water is used, the supply line shall be equipped with an electric shut off valve wired to the recirculation pump and shall be equipped with an approved backflow preventer. If two (2) or more cylinders are in use, an automatic changeover valve shall be used;

4. Chlorinator vent lines shall be conducted to the out-of-doors similar to the chlorinator room exhaust system;

5. The gas chlorinator shall be the solution feed type capable of delivering chlorine at its maximum rate without releasing chlorine gas to the atmosphere;

6. The water supply for the gas feeding equipment shall produce the flow rate and pressure required according to the manufacturer's specifications for proper operation of the equipment;

7. A self-contained breathing apparatus (SCBA) designed for use in a chlorine atmosphere and of a type approved by the Mine Safety and Health Administration (MSHA) or the National Institute for Occupational Safety and Health (NIOSH), shall be provided. This SCBA shall have sufficient capacity for the purpose intended. In addition a written respirator program shall be provided and employees shall be trained in the use and maintenance of such equipment to insure operability and safety. The SCBA shall be kept in a closed cabinet, accessible without a key, and located outside of the chlorine room. Installation of chlorinator equipment, and its operation, shall be carried on by and under the supervision of personnel experienced with installation and operation of such equipment. A chlorine valve shut off wrench shall be kept on the cylinder valve stem that is in use; and

8. In the event of a chlorine leak, the fire department or an agency trained in the handling of chlorine spills shall be immediately contacted. The phone numbers of the fire department or above agency shall be posted on the outside of the chlorine room door.

(e) pH control feeders. At facilities with a volume greater than 100,000 gallons, or at facilities utilizing gas chlorine as a disinfectant, a chemical feeder of positive displacement type shall be installed for the purpose of applying chemicals to maintain pH of facility water within the range of seven and two-tenths (7.2) to seven and eight-tenths (7.8). A solution tank of at least forty (40) gallons capacity shall be provided.

(f) Erosion type chlorine feeders shall be prohibited.

(15) Testing equipment shall be provided at all swimming and bathing facilities, maintained with fresh reagents, and consist of at least the following:

(a) A DPD (Diethyl-P-Phenylene Diamine) colorimetric test kit shall be provided, which will determine free disinfectant residual, combined disinfectant residual, total alkalinity, and pH of the facility water. Test kits using orthotolidine reagents are not acceptable;

(b) There shall be at least five (5) chlorine color standards and at least five (5) pH color standards. Chlorine standards shall range from one-tenth (0.1) to three (3.0) p.p.m. and pH standards shall range from six and eight-tenths (6.8) to eight and four-tenths (8.4), as a minimum. Both tests shall be accurate to within two-tenths (0.2) units; and

(c) Facilities using cyanurates for stabilization shall have a test kit to measure the cyanuric acid concentration. The cyanuric acid test kit shall permit readings up to 100 p.p.m.

Section 10. Operational Water Quality Standards. (1) Disinfectant residuals for swimming and diving pools, wading pools, water slides, and wave pools:

(a) Chlorine residual shall be maintained between one (1.0) p.p.m. and two and five-tenths (2.5) p.p.m. as free available chlorine.

(b) Bromine residual shall be maintained between one (1.0) p.p.m. and two and five-tenths (2.5)

p.p.m. as free available disinfectant.

(c) Pools stabilized with cyanuric acid shall meet the following criteria:

1. Be an outdoor facility;
2. Maintain one and five-tenths (1.5) to two and five-tenths (2.5) p.p.m. free available chlorine residual; and

3. Cyanuric acid concentration twenty-five (25) p.p.m. to fifty (50) p.p.m.

(d) If the presence of chloramines is determined, superchlorination is required, and the chloramine level shall not exceed two-tenths (0.2) p.p.m.

(2) Disinfectant residuals for spas:

(a) Chlorine residual shall be maintained between two (2.0) p.p.m. and three (3.0) p.p.m. as free available chlorine;

(b) Bromine residual shall be maintained between two (2.0) p.p.m. and three (3.0) p.p.m. as free available disinfectant; and

(c) If the level of chloramines exceeds two-tenths (0.2) p.p.m., superchlorination is required. During the superchlorination process and until such time as free chlorine levels return to three (3) p.p.m. or less, the facility shall be closed.

(3) pH. The pH of the facility water shall be maintained in a range of seven and two-tenths (7.2) to seven and eight-tenths (7.8). For corrosive water supplies, the alkalinity level shall be suitably adjusted to allow maintenance of the pH level.

(4) Turbidity. Facility water shall have sufficient clarity at all times to meet one (1) of the following:

(a) A black disc, six (6) inches in diameter, is readily visible when placed on a white field at the deepest point of the pool;

(b) The openings of the main outlet grate are clearly visible by an observer on the deck; and

(c) For wading pools the bottom of the pool shall be clearly visible.

(5) Total alkalinity. The alkalinity of the facility water shall not be less than fifty (50) nor more than 180 p.p.m., as determined by suitable test kits.

(6) Temperature. The water temperature for indoor swimming and bathing facilities other than spas shall not be less than seventy-six (76) degrees Fahrenheit nor more than eighty-four (84) degrees Fahrenheit. The cabinet may allow variances from the above temperature limits for special use purposes as competition, physical therapy, or instruction of children. Variances may be approved if proof is presented showing that a variance from the temperature requirements is necessary for the special uses stated, and that the variance will not jeopardize public health. Air temperature at an indoor facility shall be higher than the water temperature, except for spas. In no instance will water temperatures for any facility including spas be permitted to exceed 104 degrees Fahrenheit. All facilities with heated water shall be provided with at least one (1) breakproof thermometer located within the facility water in a conspicuous location. The thermometer shall be securely mounted to prevent tampering by bathers.

(7) The facility operator shall perform tests for each of the above water quality characteristics before opening and during all hours of operation based on the frequency schedule listed below, and record all test results on a daily operational log sheet:

(a) Disinfectant residual and pH shall be checked at least three (3) times daily with a greater frequency if bather load or climatic conditions warrant.

(b) Turbidity - daily, or more often as needed.

(c) Alkalinity, cyanuric acid (if used) - weekly, or more often as needed.

(d) Temperature:

1. Spas - daily, or more often as needed; and

2. All other indoor facilities - daily.

(8) All spas shall be completely drained, thoroughly cleaned, and refilled with potable water at least once per week. Cleaners used shall be compatible with facility wall and bottom finishes.

Section 11. General Facility Operation and Maintenance. (1) Facility and facility area.

(a) All facilities shall be maintained free from sediment, lint, dirt, and hair. Cracks and other defects in the facility shall be repaired. The walls, ceilings, floors, and equipment shall be painted as often as necessary so that they are protected from deterioration. The bottom and sides of the facility shall be maintained so that they are free from deterioration;

(b) Decks shall be rinsed as necessary to be kept clean. Indoor decks shall be disinfected at least weekly. The walk areas, overflow gutters, counters, lockers, equipment, furniture, interior partitions, and walls shall be kept in good repair, clean, and sanitary; and

(c) Management of each facility shall adopt rules for controlling of food, drink, and smoking in the facility and surrounding areas.

(2) Perimeter overflow and skimmers. The perimeter overflow system or automatic surface skimmers shall be clean and free of leaves or other obstacles which would restrict flow. The strainer baskets for skimmers shall be cleaned daily. The flow through each skimmer shall be adjusted as often as necessary to maintain a vigorous skimming action. The facility water shall be maintained at an elevation so that effective surface skimming is accomplished. The flow returning from the facility shall be balanced or valved so that the majority of flow is returned through the perimeter overflow or skimmer system.

(3) Inlet fittings. Inlets shall be checked frequently to insure that the rate of flow through each inlet is correct so that a uniform distribution pattern is established.

(4) Bather preparation facilities.

(a) The floors of dressing rooms, shower stalls, and other interior rooms shall be cleaned and disinfected daily; and

(b) Toilet rooms and fixtures shall be kept clean, free of dirt and debris, and in good repair. Floors shall be maintained in a nonslip condition. Soap dispensers shall be filled and operable. Adequate supplies of toilet tissue, disposable hand drying towels, roll type cloth towels, or suitable hand drying devices shall be maintained.

(5) Street attire. Street shoes shall not be worn on the facility decks or wet areas of the bather preparation facilities, except for those persons engaged in official duties.

(6) Safety. All public swimming facilities shall have adequate enclosures that meet the specifications of Department of Housing, Buildings and Construction. Doors or gates in the facility enclosure shall be kept closed and locked if the facility is closed.

(7) Electrical systems. Repairs to any electrical system shall be made by an electrician. All repairs shall be in accordance with the National Electrical Code and shall be approved by a certified electrical inspector.

(8) Diving equipment, ladders, hand rails, and other similar equipment, shall be maintained in good repair, be securely anchored, and have a nonslip surface.

(9) Operation of mechanical equipment.

(a) Manufacturers' instructions for operation and maintenance of mechanical and electrical equipment, as well as pump performance curves, shall be kept available at the facility;

(b) Pumps, filters, disinfectant feeders, pH controls, flow indicators, gauges, and all related components of the facility water recirculation system shall be kept in continuous operation twenty-four (24) hours a day; and

(c) Recirculation pumps. The pump shall not be throttled on the suction side (except the bottom drain line valve) during normal operation, and shall be kept in good repair and condition. The flow control valve on the discharge side shall be adjusted as necessary to maintain the design flow rate.

(10) Filtration.

(a) Sand filters.

1. The filter air release valve shall be opened as necessary, to remove air which collects in the

filter, and following each backwash; and

2. The filter shall be backwashed if the design flow rate can no longer be achieved, or as specified by the filter manufacturer, whichever occurs first.

(b) Diatomaceous earth filters.

1. The dosage of diatomaceous earth precoat shall be at least one and one-half (1 1/2) ounces per square foot of element surface area. Pressure diatomaceous earth filters shall be backwashed if the design flow rate can no longer be achieved or as specified by the filter manufacturer, whichever occurs first. If the recirculation pump stops or is shut off, the filter shall be thoroughly backwashed and the elements shall be precoated before placing the pump back into operation. Vacuum diatomaceous earth filters shall be washed if the design flow rate can no longer be achieved or as specified by the filter manufacturer, whichever occurs first;

2. Following the precoating operation, the initial filter effluent shall be either recirculated through the filter until the filter effluent is clear, or the initial filter effluent shall be discharged to waste until properly clarified water is produced; and

3. If continuous diatomaceous earth feed is required (filter loading rate exceeds one and five-tenths (1.5) gallons per minute per square foot of filter surface area), it shall be applied at a rate of one-half (1/2) - one and one-half (1 1/2) ounces per square foot of surface area per day, or as needed to extend filter cycles.

(11) Hair and lint strainers. Hair and lint strainers shall be cleaned to prevent clogging of the suction line and cavitation. The pump shall be stopped before the strainer is opened. In all cases, the hair strainer basket shall be cleaned during the time the filter is being backwashed.

(12) Flow meters. Flow meters shall be maintained in an accurate operating condition and readily accessible. The glass and the connecting tubes shall be kept clean.

(13) Vacuum and pressure gauges. The lines leading to the gauges shall be bled occasionally to prevent blockage.

(14) Gas chlorinators.

(a) Gas chlorinators shall be repaired only by a person trained in servicing these units. The facility operator shall determine the appropriate emergency personnel to contact in the event of a chlorine gas emergency and have the telephone number of said personnel conspicuously posted;

(b) Chlorine cylinders shall be stored indoors in the area designed for that purpose and away from a direct source of heat. Cylinders shall not be moved unless the protection cap is secured over the valve; and

(c) Chlorinator, gas line, injector, and cylinders shall be checked daily for leaks. Chlorine will produce a white smoke in the presence of ammonia. In case of a chlorine leak, corrective measures shall be undertaken only by trained persons wearing proper safety equipment. All other persons shall leave the dangerous area until conditions are again safe.

(15) Self-contained breathing apparatus (SCBA).

(a) A record shall be kept of SCBA usage to insure that the unit will be serviceable when needed. The SCBA shall be kept in a closed cabinet, accessible without a key, located outside of the room in which the chlorinator is located, and preferably outside the entrance to the equipment room; and

(b) The SCBA shall be serviced regularly as per manufacturer's recommendations.

(16) Positive displacement feeders.

(a) Positive displacement feeders shall be periodically inspected and serviced;

(b) To minimize sludge accumulation in the unit, the lowest practicable concentration of solution shall be used. If liquid chlorine solution is used, the dilution with water is not critical to the operation of the unit; and

(c) Sludge accumulations shall be cleaned periodically from the unit.

(17) Chlorinated cyanurates. The use of chlorinated cyanurates is prohibited.

(18) pH adjustment.

- (a) Soda ash or caustic soda may be used to raise the facility water pH;
- (b) Caustic soda shall only be used in accordance with the manufacturer's instructions. If caustic soda is intended for use, the cabinet shall be notified in writing. Protective equipment and clothing, including rubber gloves and goggles, shall be available for the handling and use of this chemical;
- (c) Sodium bisulfate or muriatic acid may be used to lower pool water pH;
- (d) Hydrochloric (muriatic) acid may only be used with proper supervision and care. Protective equipment and clothing, including rubber gloves and goggles, shall be available for handling this chemical; and
- (e) The cabinet shall be consulted in the event of unusual pH problems including corrosion or scaling or wide fluctuations in pH.

(19) Algae control.

- (a) The development of algae shall be eliminated by superchlorinating. The facility shall not be open for use during this treatment. If superchlorination fails to eliminate the algae, the cabinet shall be consulted for further advice.
- (b) Treated algae which cling to the bottom and sides of the facility shall be brushed loose, and removed by the suction cleaner and filtration system.

(20) Miscellaneous chemicals.

- (a) Chemicals other than disinfectants shall be used only with the advice and under the supervision of the cabinet;
- (b) Chemicals shall be kept covered and stored in the original container, away from flammables and heat and in a clean, dry, and well-ventilated place which prevents unauthorized access to the chemicals;
- (c) The chemicals used in controlling the quality of water shall be used only in accordance with the manufacturer's instructions; and
- (d) If polyphosphates are used for sequestering iron, the concentration of polyphosphates shall not exceed ten (10) p.p.m.

(21) Equipment rooms.

- (a) Equipment necessary for facility operation shall be housed in a lighted, ventilated room which affords protection from the weather, prevents unauthorized access, and is of sufficient size for operation and inspection;
- (b) The equipment room floor shall slope toward drains and shall have a nonslip finish;
- (c) A hose bib with a vacuum breaker shall be installed in the equipment room;
- (d) Suitable space, if not provided in the equipment room, shall be provided for storage of chemicals, tools, equipment, supplies, and records where they can be acquired by the facility operator without leaving the premises. The storage space shall be dry and protected from unauthorized access; and
- (e) The equipment room and all other storage areas mentioned above shall be maintained in a clean, uncluttered condition, and shall not be used for storage of materials not essential to operation and maintenance of the facility.

(22) Maintenance of bathing beaches.

- (a) Beach areas shall be maintained free of litter and waterborne debris. Beverage containers of glass or metal containers with detachable pull tabs shall be prohibited.
- (b) A layer of sand or gravel of sufficient depth to prevent the creation of mud holes or slicks and to reduce shallow water turbidity shall be maintained on all beach areas, and shall extend beneath the water of all wading and swimming areas; and
- (c) Wading, swimming, and diving areas shall be examined by the facility operator on a routine basis, and immediately after high water conditions for floating or sunken debris, and obstructions at diving areas and high water turbidity which may present safety hazards to bathers.

Section 12. Facility Records. (1) The operator of each facility shall keep a daily record of information regarding operation including disinfectant residuals, pH, maintenance procedures, and recirculation, together with other data as may be required on form DFS-352 - Swimming Pool Log Sheet furnished by the cabinet. This data shall be kept on file by the operator and submitted to the cabinet as requested. Proper operating records, which include the following shall be kept showing daily or weekly results as applicable:

- (a) Disinfectant residuals;
- (b) pH readings, total alkalinity, cyanuric acid level (if applicable); and
- (c) Malfunctioning of equipment.

(2) If two (2) or more facilities are operated on the same site, separate records shall be maintained for each facility.

Section 13. Personnel. (1) Operator. A facility operator shall be responsible for the operation and maintenance of all swimming and bathing facilities. The operator shall be available at all times when the facility is open for use.

(2) Lifeguards.

(a) A lifeguard or lifeguards shall be provided at all facilities which allow bathers sixteen (16) years of age or under to enter the facility area without a responsible person seventeen (17) years of age or older present.

(b) All facilities which do not provide a lifeguard must post and enforce the following rule: "No person may enter the facility area alone or swim alone."

(c) If lifeguards are required, lifeguards shall comply with the following:

1. Lifeguards shall have a current lifesaving certificate. Current training as a lifesaver or water safety instructor by the American Red Cross, YMCA, or equivalent shall satisfy this requirement. The certificate of competency shall be prominently posted;

2. More than one (1) lifeguard shall be on duty at large facilities or facilities with a large number of bathers. Lifeguards shall be provided at a ratio of one (1) per 200 bathers or one (1) per 2,000 square feet of water surface area, whichever is less;

3. Lifeguards shall be dressed in swimming attire; and

4. Lifeguards assigned to the supervision of the facility shall not be subject to duties that would distract their attention from proper observation of persons in the facility area, or that would prevent immediate assistance to persons in distress in the water.

Section 14. Safety Equipment. (1) Facilities other than beaches having an area of more than 2,000 square feet of water surface area shall be provided with an elevated lifeguard chair. An additional lifeguard chair shall be provided for each additional 2,000 square feet of water surface area or major fraction more than half thereof. They shall be located to provide a clear view of the facility bottom in the area under surveillance.

(2) Beaches shall be provided with an elevated lifeguard chair for each 100 linear feet of beach front, with an additional lifeguard chair for each additional 100 linear feet of beach front or fraction thereof. The chairs shall be located on the beach to provide a clear view of all areas under surveillance and to provide the quickest response time.

(3) The following lifesaving equipment shall be provided:

(a) A U.S. Coast Guard approved ring buoy not more than fifteen (15) inches in diameter to which shall be attached a three-sixteenths (3/16) inch rope of length one and one-half (1 1/2) times the maximum pool width;

(b) A life pole or shepherd's crook type of pole having blunted ends with a minimum length of twelve (12) feet; and

(c) One (1) plywood backboard with straps, made to the specifications of the American Red Cross

for back and neck injuries.

(4) The equipment listed in subsection (3) of this section shall be considered as one (1) unit (except paragraph (c)) and shall be considered as adequate for 2,000 square feet of facility water surface area. An additional unit shall be provided for each additional 2,000 square feet or major fraction thereof.

(5) Facilities limited to small spas, of less than 144 square feet of water surface area, shall not be required to provide the equipment listed in subsection (3) of this section, but shall meet the requirements of subsections (7), (10), and (11) of this section.

(6) Bathing beach facilities shall provide the following lifesaving equipment in addition to that listed in subsection (3) of this section:

(a) Paddle board or surfboard;

(b) At least one (1) lifeboat, containing one (1) unit of lifesaving equipment and outfitted to meet state water safety administrative regulations; and

(c) A torpedo shaped buoy.

(7) All facilities shall be equipped with a minimum of one (1) standard twenty-four (24) unit first aid kit or its equivalent, which shall be kept filled and ready for use. Additional units shall be provided for each additional 2,000 square feet of facility area or major fraction thereof.

(8) Lifesaving equipment shall be mounted in conspicuous places at lifeguard chairs or other readily accessible locations. Its function shall be plainly marked, and this equipment shall be kept in repair and ready condition. Bathers or other persons shall not be permitted to tamper with, use for any purpose other than its intended use, or remove such equipment from its established location. This equipment at beaches shall be located at each lifeguard chair, with the lifeboat mentioned in subsection (6)(b) of this section being located at the most centrally stationed lifeguard chair.

(9) The hydrojet auxiliary air or water pump for a spa shall be controlled by an on-off switch with a fifteen (15) minute timer located and labeled at least five (5) feet away from the spa.

(10) All facilities shall have a nonpay telephone on the premises which is readily accessible and conspicuously located; for isolated facilities two (2) way radio communication systems to a manned telephone system may be substituted. The telephone number of a police, fire department, emergency medical service, or a hospital shall be posted in a conspicuous place near the telephone.

(11) All drownings and injuries requiring hospitalization shall be immediately reported to the cabinet.

Section 15. Spectator and Bather Administrative Regulations. (1) Rules governing the use of the facility and instructions to bathers shall be displayed on placards at the entrance to dressing rooms and shall be enforced by the facility operator. Posting of rules and other instructions shall provide that:

(a) Admission to the facility is refused to all persons having any contagious disease, infectious conditions as colds, fever, ringworm, foot infections, skin lesions, carbuncles, boils, inflamed eyes, ear discharges, or any other condition which has the appearance of being infectious. Persons with excessive sunburn, abrasions which have not healed, corn plasters, bunion pads, adhesive tape, rubber bandages, or other bandages of any kind are not permitted. A person under the influence of alcohol or exhibiting erratic behavior shall not be permitted in the facility area;

(b) No food, drink, gum, or tobacco will be allowed in other than specially designated and controlled sections of the facility area;

(c) Personal conduct within the facility shall assure that the safety of self and others is not jeopardized. No running and no boisterous or rough play (except supervised water sports) are permitted;

(d) People in street shoes and other spectators are not allowed in the facility, on the deck, and in the "wet" areas of the bathhouse, except those engaged in official duties;

(e) Spitting, spouting of water, blowing the nose, or otherwise introducing contaminants into the

facility water is not permitted;

(f) Glass, soap, or other material which might create hazardous conditions or interfere with efficient operation of the facility shall not be permitted in the facility or on the deck;

(g) All apparel worn in the facility shall be clean;

(h) Diving in shallow water is not permitted;

(i) Caution shall be exercised in the use of diving boards; and

(j) Animals shall be excluded from the facility area.

(2) Due to the nature of bathing beaches, subsection (1)(c), (d), and (g) of this section shall not apply. Subsection (1)(a) and (b) of this section shall be enforced at the discretion of the facility operator, except for parts dealing with those persons with excessive sunburn or those under the influence of alcohol or exhibiting erratic behavior, which shall be enforced at all facilities.

(3) In addition to the requirements of subsection (1) of this section, a caution sign shall be mounted adjacent to all spas which contain the following warnings:

CAUTION

Pregnant women, elderly persons, and persons suffering from any heart condition or disease, diabetes, or high/low blood pressure should not enter the spa without prior medical consultation and permission from their doctor.

Do not use the spa while under the influence of alcohol, tranquilizers, or other drugs that cause drowsiness, or that raise or lower blood pressure.

Do not use at water temperatures greater than 104 degrees Fahrenheit.

Do not use alone.

Unsupervised use by children is prohibited.

Enter and exit slowly.

Observe reasonable time limits (that is, ten (10) to fifteen (15) minutes), then leave the water and cool down before returning for another brief stay.

Long exposure may result in nausea, dizziness, fainting, or death.

Keep all breakable objects out of the area.

Shower before entering the spa.

(4) A sign shall be posted in the immediate vicinity of the spa stating the location of the nearest telephone and indicating that emergency telephone numbers are posted at that location.

Section 16. Swimming Suits and Towels Furnished by Management. All swimming suits and towels used by swimmers and maintained for public use shall be cleaned after each use. These items shall be handled in a sanitary manner.

Section 17. Facility Inspection. (1) Seasonal facilities.

(a) All owners or operators of seasonal facilities, prior to opening to the public, shall certify to the cabinet, in writing, that the facility is in compliance with the requirements of this administrative regulation except in instances where the cabinet has made an inspection prior to its opening. For seasonal facilities, the cabinet shall make at least two (2) full facility inspections during the operating season. The cabinet, at its discretion, may require one (1) of the full facility inspections to be performed prior to a facility's opening; and

(b) The facility owner or operator shall be responsible for notifying the cabinet of the proposed opening date.

(2) Continuous operation (indoor) facilities shall receive a full facility inspection by the cabinet at least once each six (6) months.

(3) New facilities shall receive final construction approval inspections by the cabinet, and other affected state and local regulatory agencies, prior to placing the facility in operation. It shall be the owner or operator's responsibility to notify the cabinet and other involved agencies of construction completion and call for inspection.

(4) Facilities other than beaches shall be inspected at a minimum of once each thirty (30) day period by the cabinet on a monitoring basis. The monitoring inspection shall consist of the following:

- (a) Disinfectant residual testing (free available residual) and combined disinfectant in p.p.m.;
- (b) pH testing;
- (c) Total alkalinity testing;
- (d) Cyanuric acid testing (if cyanuric acid stabilizers are used);
- (e) Turbidity assessment;
- (f) Temperature testing (if heated water facility);
- (g) Review of operator's daily log;
- (h) Visual scanning for algae or debris; and
- (i) Other checks as necessary.

(5) Beaches shall receive monitoring inspections once each month or anytime immediately after periods of heavy rainfall. Monitoring inspections for beaches shall include general sanitation and safety checks as necessary.

(6) The cabinet may make as many additional inspections and reinspections as are necessary for the enforcement of this administrative regulation.

(7) If an agent of the cabinet makes an inspection of a public swimming and bathing facility, he shall record his findings on an official cabinet inspection report form DFS-349 - Public Swimming and Bathing Facilities Inspection or DFS-350 - Public Swimming and Bathing Facilities Beach Inspection Report and provide the facility owner or the operator with a copy. The inspection report shall:

- (a) Set forth any violation(s) if found;
- (b) Establish a specific and reasonable period of time for the correction of the violation(s) found; and
- (c) State that failure to comply with any notice issued pursuant to the provisions of this administrative regulation may result in closure of the facility.

Section 18. Water Sampling and Testing. (1) A water sample may be collected from facilities if inspections or monitoring indicates water quality standards are not being maintained, or there is a suspected water borne disease outbreak, and shall be submitted to the Health Services Laboratory or other laboratory licensed by the Natural Resources and Environmental Protection Cabinet for analysis. Samples shall be collected in approved containers and by approved sampling procedures.

(2) Samples shall be collected and analyzed for any of the following or other contaminants:

- (a) Total coliform;
- (b) Fecal coliform; and
- (c) Pseudomonad organisms.

(3) Multiple samples may be collected at bathing beaches to assure adequate representation of the entire facility water area.

(4) Need for additional samples at other times shall be triggered by the results of monitoring inspections, reported disease outbreaks associated with the facility, or failure of previous samples to meet the standards outlined in Sections 5 and 19 of this administrative regulation. If a sample shows a positive test for contaminants as specified in subsection (2)(a), (b), and (c) of this section, the sample shall be repeated within one (1) to seven (7) days.

Section 19. Bacteriological Quality of Facility Water. (1) For facilities other than bathing beaches,

no more than two (2) consecutive samples shall contain either:

(a) More than 200 bacteria per milliliter, as determined by the standard (thirty-five (35) degrees Centigrade) agar plate count;

(b) Show a positive test (confirmed test) for coliform organisms in any of the five (5) ten (10) milliliter portions of a sample or more than two (2.0) coliform organism per 100 ml when the membrane filter test is used;

(c) Show a positive test (confirmed test) for pseudomonas organisms; or

(d) Show a positive test for fecal coliform organisms.

(2) Bathing beaches shall comply with the standards set forth in Section 5(3)(a) of this administrative regulation.

Section 20. Conditions requiring Closure of a Facility and Enforcement Provisions. (1) If the cabinet finds any of the following conditions, it may immediately order by written notice the owner or operator to close the facility and to prohibit any person from using the facility:

(a) If conditions at a facility and appurtenances, including bathhouse facilities, upon inspection and investigation by a representative of the cabinet, create an immediate danger to health or safety;

(b) If the cabinet upon review of results of bacteriological analyses of water samples collected from a facility, finds that the water does not conform to the bacteriological standards promulgated by the cabinet for proper swimming and bathing water quality;

(c) If an environmental survey of an area shows evidence of sewage or other pollutorial or toxic materials being discharged to waters tributary to a beach creating an immediate danger to health or safety;

(d) If turbidity levels of facility water do not meet the requirements of Section 10(4) of this administrative regulation;

(e) If in such cases as it is required, the presence of a satisfactory disinfectant residual, prescribed by the cabinet is absent;

(f) In any instance where the owner, operator, or any other employee or representative of the owner interferes with duly authorized agents of the cabinet, bearing proper identification, in the performance of their duties;

(g) If recirculation system(s), filtration system(s), or disinfectant system(s) are not in operation (with exceptions for maintenance, and seasonal shut down); or

(h) If serious or repeated violations of any of the requirements of the administrative regulations are found.

(2) The notice shall state the reasons prompting the closing of the facility and a copy of the notice shall be posted conspicuously at the facility by the owner or operator.

(3) Any owner or operator affected by an order is entitled, upon written request on form DFS-212 - Request for Hearing to the cabinet, to a hearing in accordance with 902 KAR 1:400.

(4) If the conditions are abated or if the results of analyses of water samples collected from the facility, in the opinion of the cabinet, comply with the cabinet's bacteriological standards for acceptable water quality, or if the turbidity decreases to the permissible limit, or if the disinfectant residual reaches a satisfactory level as prescribed by administrative regulation, the cabinet may authorize reopening the facility. If sources of sewage, pollution, or toxic materials discovered as a result of an environmental survey are eliminated, the cabinet may authorize reopening of such beach.

(5) In all other instances of violation of the provisions of this administrative regulation, including nonpayment of fees, the cabinet shall serve upon the owner or operator a written notice specifying the violation(s) in question and afford a reasonable opportunity to correct same. If an owner or operator has failed to comply with any written notice issued under the provisions of this administrative regulation, the owner or operator shall be notified in writing that the facility shall be closed at the end of ten (10) days following service of such notice, unless a written request for a hearing is filed with

the cabinet, by the owner or operator, within such ten (10) day period.

(6) All administrative hearings shall be conducted in accordance with 902 KAR 1:400.

(7) Any person whose facility has been closed may, at any time make application for a reinspection on form DFS-215 - Application for Reinstatement of Suspended Permits for the purpose of reopening the facility. Within ten (10) days following receipt of a written request, including a statement signed by the applicant that in his opinion the conditions causing closure of the facility have been corrected, the cabinet shall make a reinspection. If the facility is found to be in compliance with the requirements of this administrative regulation, the facility shall be reopened.

(8) For serious or repeated violations of any of the requirements of this administrative regulation or for interference with the agents of the cabinet in the performance of their duties, the facility may be permanently closed after an opportunity for a hearing has been provided in accordance with 902 KAR 1:400. Prior to the action, the cabinet shall notify the owner or operator, in writing, stating the reasons for which the facility is subject to closure and advising that the facility shall be permanently closed at the end of ten (10) days following service of the notice unless a request for a hearing is filed with the cabinet by the owner or operator, within such ten (10) day period.

Section 21. Existing Facilities and Equipment. (1) Notwithstanding the other provisions of this administrative regulation, existing facilities and equipment being used prior to the effective date of this administrative regulation, which do not fully meet the design, construction, and materials requirements of this administrative regulation, may be continued in use, if in good repair, capable of being maintained in a sanitary condition, meet facility water quality standards, and create no health or safety hazard.

(2) If existing equipment, components, piping, or fittings involved in the facility water treatment system are replaced to effect repairs, the replacement equipment, components, piping, or fittings shall meet the requirements of this administrative regulation. If replacement occurs, it shall be the owner's or operator's responsibility to notify the cabinet as to what was replaced and what was used for a replacement.

Section 22. Effect on Local Administrative Regulations. Compliance with this administrative regulation does not relieve any person from compliance with any other state or local laws, dealing with pool operation and maintenance matters, or zoning requirements which may also be applicable.

Section 23. Variances. (1) All facilities shall be constructed or remodeled in compliance with the provisions of these administrative regulations, except that an applicant may request and the cabinet may grant a variance in those cases where it is determined that the variance would not affect seriously the safe and healthful operation of the facility.

(2) Before granting a variance, the cabinet shall require adequate proof from the applicant that the requested variance will comply with the basic intent of these administrative regulations and that no safety or health hazard would be created if the variance is granted. (13 Ky.R. 2177; Am. 14 Ky.R. 214; eff. 8-5-87; 17 Ky.R. 480; 1377; eff. 9-19-90; 22 Ky.R. 2378; eff. 8-1-96.)